

NOTE ON PHOTOGRAPHING AÉRIAL RIPPLE MARK.

Fig. 3 is reproduced from a photograph which I took of some remarkable ripple clouds near Bournemouth, on August 5, 1900, at about 5.15 p.m. The camera was pointed south; the sun, of course, is on the right, and the shadow of each cloud can be seen on the right-hand edge of the next one. These clouds were drifting rapidly to the east (left), the breeze at the ground level blowing towards the same direction. Ruskin wrote¹ long since of vapour "falling into ripples like sand." The general likeness is indeed striking, but the differences of detail are also noticeable, which is not to be wondered at, seeing that the cloud ripples are not the counterpart of the rippled sand, but of the whirling water between the sand ridges. How then shall we see the form of the aerial ripple mark where there is only blue sky? Simply by reproducing our photograph as a negative (Fig. 4). With this compare Fig. 5, an ordinary (positive) view of the wave-formed ripple mark of the strand, taken at Montrose, N.B., March 1900. Note the similarity of the sharp-topped ridges of still air, between the revolving cores where the clouds are, to the knife-edged ridges of the sand. But most remarkable of all is the precise correspondence of the confluence of ridges, wherever the wave-length of the ripple



FIG. 5.—Ripple mark of the strand. Photograph taken at Montrose, N.B., March 1900.

mark is about to change *per saltum* (for the wave-length of ripple mark increases in "multiple proportion," three ridges merging into two). And here our sky photographs are superior to, and throw light upon, our sand ripple mark photograph, for the latter had to be taken when the rippling action had ceased and the troughs were no longer filled with whirling water. Fig. 3, however, indicates what is going on where the ripple ridges are being merged, for the lights and shadows of the cloud indicate the activities of the working parts of the system. The rippled cloud here photographed, and consequently the true air ripples also, are symmetrical. This is not always the case; the clouds are often opaque (thick) at one edge and transparent (thin) at the other. In this case the form of the aerial ripple mark must be more like that of current mark, of aeolian sand ripples and of tidal sand ripples. The likeness between cloud negative and sand ripple positive would be more striking but for the circumstance that we look up at the clouds and down at the sand. This makes the perspective different in the two. The real resemblance is best seen when separate prints are handled, one or other of which being inverted the perspective becomes similar in both.

¹ *Modern Painters*, vol. v. part 7, chap. i.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—A meeting of members of the Senate and others interested in the proposal to make some acknowledgment to Prof. Living for his valuable services to science and to the University will be held in the combination room of St. John's College on Saturday next, April 27, at 2.30 p.m.

MR. RANDOLPH MORGAN, of Philadelphia, has given the sum of 200,000 dollars to the University of Pennsylvania for a new physical laboratory.

FROM the Catalogue of the University of Cincinnati, for 1900-1901, we see that the total endowment of the University amounts to 3,357,308 dollars, or nearly 700,000/. The latest large donation was in the year 1899, when Mr. David Sinton gave the University 100,000 dollars upon the condition that the income derived therefrom should be used in maintaining the Academic Department. The University has an observatory well equipped for carrying on astronomical work. The observatory is at the present time co-operating with the International Geodetic Association in the determination of the variation of latitude.

LORD CURZON, Viceroy of India, visited on Tuesday the Mahomedan Anglo-Oriental College, which was founded at Aligarh by Sir Syed Ahmad in 1875 with the view of affording Mahomedan youths an opportunity of gaining a first-class education under English professors. A marked success has since been obtained; the Nizam and all the Mahomedan notables affording liberal support. Alluding to the desire of Mr. Beck, the late principal, who devoted his life to the College, to expand the institution into a residential University, the *Times* reports Lord Curzon to have said that the project had reached the ears of the late Queen, who inquired most sympathetically about it. Lord Curzon warned his hearers that they would never get from a University consisting of little but examining boards that lofty ideal of education, the sustained purpose and the spirit of personal devotion associated with the historic Universities of England, and also produced in some measure by the ancient Universities of Islam.

THE reality of the competition between School Board classes and Technical Institutions in some places is clearly exemplified by the following extract, from the latest Report of the Governing Body of the Goldsmiths' Institute, New Cross—in every respect an excellent institution, where thorough instruction is given in science and technology. "The Governors in their last Report drew attention to the decline in the number of students attending certain classes. This decline began in 1898 (down to that year the class entries had been uniformly progressive), and was mainly due to the extension of the Free Evening Continuation Schools of the London School Board, and particularly to certain special centres which have been opened close to the Institute. It will be sufficient on the present occasion to state that the same causes still operate to check the natural growth of the classes affected." Reference has been made (p. 553) to the recent decision in the Court of Appeal that School Boards cannot legally support classes of this character or science schools out of the rates, but it has not yet been decided whether this ruling will be accepted. The foregoing extract emphasises the necessity for finally deciding upon the scope or area of influence of the various educational authorities, and so giving our educational system an organic structure in which each part has clearly defined work to do.

A MEETING of the Agricultural Education Committee was held on Tuesday, Sir William Hart Dyke presiding. The executive committee reported that the two subjects most urgently requiring

attention at the present moment were:—(1) The union or co-ordination of the work of the Board of Education and the Board of Agriculture in dealing with agricultural and rural instruction; and (2) the training of teachers in nature knowledge and other rural subjects. Speaking upon the first of these subjects, Mr. Hobbhouse, M.P., said the Board of Agriculture only inspected certain of the higher agricultural schools, and did not systematically advise or report on the work of the local authorities. It had no voice in drawing up schemes for agricultural instruction for which grants were given under the Directory or Code. It thus failed to take the position assumed by the agricultural departments of nearly every other country, including Ireland and our own colonies, where the progress of agriculture was systematically promoted by encouraging the best methods of instruction. The yearly sum devoted to agricultural instruction and research in the United States (federal grants only) 700,000*l.*; in Canada, 156,000*l.*; in France, 152,460*l.*; and in Württemberg, 65,000*l.*; while in England the sum was only about 15,000*l.* It would seem that the example of Scotland should be followed in England, and that the educational powers of the Board of Agriculture should be transferred to the Board of Education, especially as under the Board of Education Act, 1899, there already existed power to make a similar transfer by Order in Council. The Board of Agriculture would then, much to its own relief, cease to be an educational authority, though it might, perhaps, retain some supervision over certain experimental work carried on by agricultural societies.

SCIENTIFIC SERIALS.

American Journal of Science, April.—The magnetic theory of the solar corona, by F. H. Bigelow. A discussion of an experiment of Ebert on the behaviour of an electrified sphere in a magnetic field, when placed in a rarefied gas. The phenomena observed in the corona of the sun agree in a remarkable way with the effects produced in the above experiment.—Tertiary springs of Western Kansas and Oklahoma, by C. N. Gould.—Some fundamental propositions in the theory of elasticity. A study of primary or self-balancing stresses, by F. H. Cilley. A discussion of the effects of initial or "primary" strain of a body upon its elasticity. Since these strains and stresses are a component of the actual strains and stresses existing in substances, it is concluded that the latter cannot be defined through the equations of elasticity alone.—The boiling point of liquid hydrogen determined by the hydrogen and helium gas thermometers, by T. Dewar. From the *Proceedings of the Royal Society*.—On the nature of vowels, by E. W. Scripture. Reproductions of a magnified set of curves from a gramophone. The results tend to show that the movement of the air in the mouth cavity is a free vibration and not a forced one. The cord movements in the vowels are of the nature of explosive openings and not of the usual vibratory form found in most musical instruments.—Note on the behaviour of the phosphorus emanation in spherical condensers, by C. Barus.—The remarkable concretions of Ottawa County, Kansas, by W. T. Bell.

Annalen der Physik, April 1.—The application of the method of residual rays to the proof of the law of radiation, by H. Rubens and F. Kurlbaum. A discussion of the various expressions which have been proposed to show the relations between the intensity of radiation, the wave length and the temperature. A detailed account of the experimental methods is given, measurements being carried out at temperatures between -180°C. and 1450°C. , a graphical comparison being given between the experimental results and those calculated from the formulæ proposed by Wien, Thiesen, Rayleigh and Planck. The simple formula of Planck would appear to be the best hitherto proposed.—The elementary laws of electro-dynamics, by E. Wiechert.—On the absorption of heat by carbonic acid, by S. Arrhenius. An account of the results of measurements of the absorptive capacity for heat of carbonic acid. The results are applied to the discussion of the effects of carbonic acid in the atmosphere upon the temperature of the air.—On the surface tension of water surfaces covered with an oil layer, and on the range of molecular action, by R. H. Weber. The value deduced from the experiments for the radius of molecular action is $115\ \mu\mu$., considerably greater than that deduced from the experiments of Reinold and Rucker, 10 to $17\ \mu\mu$.—On the phenomena in induction coils, by K. R. Johnson.—Mechanical vibrations of an isolated stretched wire with

visible electrical discharges, by O. Viol. If an isolated stretched wire is charged from one end with electricity at high potential, transverse vibrations are set up in the wire, and if the electricity is negative and the charge sufficiently high for a visible discharge to take place along the wire, only the nodes appear to shine.—On the mode of action of coherers, by K. E. Guthe.—Contribution to the knowledge of the thermomagnetic longitudinal effect, by L. Lownds.—On the band spectra of alumina and nitrogen, by G. Berndt.—On the change of the absorption of light in solid bodies with the temperature, by J. Königsberger.—On the influence of a resistance free from self-induction on the oscillatory discharge of a condenser, by T. Mizuno.—The air barometer, by H. A. Naber.—On the spectrum equation of polished platinum, by D. A. Goldhammer.—On the pressure of light rays, by D. A. Goldhammer.—On the magnetism of iron, by C. Fromme.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, March 21.—Prof. Thorpe, president, in the chair.—The following papers were read:—Researches on morphine, part ii., by S. B. Schryver and F. H. Lees. The authors have previously shown that bromomorphide is decomposed by water with formation of isomorphine, a base isomeric with morphine; it is now shown that another isomeric, β -isomorphine, is also produced in small quantity. Phosphorus trichloride converts codeine into chlorocodeine, which corresponds with bromomorphide and is convertible into isocodeine, a base isomeric with codeine.—The constitution of pilocarpine, part ii., by H. A. D. Jowett. Bromine acts upon isopilocarpine with formation of dibromoisopilocarpine perbromide and small quantities of monobromoisopilocarpine and isopilocarpinic acid; the latter is an oil of the composition $\text{C}_{11}\text{H}_{16}\text{O}_4\text{N}_2$. On oxidising dibromoisopilocarpine with permanganate, pilopinic acid, $\text{C}_8\text{H}_{11}\text{O}_4\text{N}$, and pilopic acid, $\text{C}_7\text{H}_{10}\text{O}_4$, are obtained. At 100° , in presence of water, bromine acts on isopilocarpine with production of dibromoisopilocarpinic, monobromoisopilocarpinic, bromopilocarpinic and bromopilocarbinic acids.—The chemical action of *Bacillus coli communis* and similar organisms on carbohydrates and allied compounds, by A. Harden. The author has examined the products of the action of *B. coli communis* and *B. typhosus* on carbohydrates, and notes that the production of alcohol by the former organism appears to depend on the presence of the group $\text{CH}_2(\text{OH})\cdot\text{CH}_2\text{OH}$ in the compound to be fermented.—Action of dry silver oxide and ethyl iodide on benzoylacetate ester, deoxybenzoin and benzyl cyanide, by G. D. Lander.—Alkylation of acylarylamines, by G. D. Lander. Dry silver oxide and ethyl iodide convert the acylarylamines into the imino-ether, whilst if methyl iodide is substituted for ethyl iodide, a mixture of the imino-ether and the acylalkylamine usually results.—The preparation of aliphatic imino-ethers from amides, by G. D. Lander.—Note on the latent heats of evaporation of liquids, by H. Crompton.—On the atomic weight of lanthanum and on the error of the "sulphate method" for the determination of the "equivalent" of the rare earths, by B. Brauner and F. Pavliček. It is shown that in the conversion of lanthanum oxide into sulphate for atomic weight determinations, small quantities of acid sulphate are produced and cause error in the determination of the equivalent; it is further shown that lanthanum, as hitherto known, is a mixture of two earth metals in which the true lanthanum of atomic weight 139.0 predominates.—On the atomic weight of praseodymium, by B. Brauner. The author has determined the atomic weight of praseodymium by four methods and made ebullioscopic determinations with the chloride in alcohol solutions; the final atomic weight of praseodymium is given as 140.94.—On praseodymium tetroxide and peroxide, by B. Brauner. Praseodymium tetroxide, Pr_2O_4 , is obtained as a black powder, by fusing the nitrate with nitre and on treating praseodymium nitrate with hydrogen peroxide the hydrate of praseodymium peroxide, Pr_2O_5 , is produced.—Note on neodymium, by B. Brauner. The number 143.5 was found by the sulphate method for the atomic weight of neodymium; this metal gives a tetroxide, Nd_2O_4 , and a peroxide, Nd_2O_6 .—Contribution to the chemistry of thorium, by B. Brauner. The author concludes that thorium does not consist of a single element because on fractional hydrolysis of ammonium thorium oxalate, fractions are obtained in which the